

Development of Electronic Student Activity Sheet (E-LKM) Utilization of Used Cooking Oil for Chemistry Education Students

Ahmad Khairu Ramadhan¹, Maria Erna², Roza Linda³

¹ Universitas Riau, Pekanbaru, Indonesia; ahmadkhairu99@gmail.com

² Universitas Riau, Pekanbaru, Indonesia; mariaerna@lecturer.unri.ac.id

³ Universitas Riau, Pekanbaru, Indonesia; roza.linda@lecturer.unri.ac.id

ARTICLE INFO

Keywords:

e-lkm;
used cooking oil;
chemistry education student

Article history:

Received 2022-06-28

Revised 2023-05-09

Accepted 2023-05-20

ABSTRACT

This study aims to develop an electronic student activity sheet (E-LKM) utilization of used cooking oil for chemistry education students in entrepreneurship courses. This research is development research with the Plomp development model. The data obtained came from 6 validators (3 material experts and 3 media experts), 3 lecturers of entrepreneurship courses, and 30 students from three universities, namely Riau University, Sultan Syarif Kasim Riau State Islamic University, and Riau Islamic University. Data collection techniques are used in the form of interviews, documentation, and questionnaires. The data analysis technique is by calculating the percentage score of the validation assessment and user response. The results showed that the developed E-LKM met the very valid criteria with a percentage of 92.13% by material experts and 90.70% by media experts. The results of the responses of lecturers and students show that the developed E-LKM meets the very good criteria with a percentage of 82.93% by lecturers and meets the attractive criteria of 84.51% by students.

This is an open-access article under the [CC BY-NC-SA](https://creativecommons.org/licenses/by-nc-sa/4.0/) license.



Corresponding Author:

Ahmad Khairu Ramadhan

Universitas Riau, Pekanbaru, Indonesia; ahmadkhairu99@gmail.com

1. INTRODUCTION

The coronavirus pandemic has accelerated the transformation of education. In a very short time, the whole world has changed conventional face-to-face learning patterns in schools into distance learning (PJJ) which relies heavily on technology. UNICEF, WHO, and IFRC in the COVID-19 Prevention and Control in Schools stated that when the situation with the spread of the virus is accelerating, schools must be closed and the education process must continue through online learning activities using various media. Lecturer creativity in designing online learning for students also plays an important role. Ensuring that learning becomes fun and meaningful, arouses creativity, and critical thinking, and can make students independent is certainly not an easy matter. Moreover, lecturers cannot directly face-to-face with students. The lecturer's foresight in making designs and methods that can attract students to continue to be enthusiastic about learning is something that deserves attention. If you only give assignments to students, of course, it will make students bored (Aulia, 2020). Therefore, teaching materials are needed that can streamline the learning process and help students to actively participate and collaborate during the lecture process.

Teaching materials that can facilitate students to improve their understanding of concepts, creativity, and learning outcomes are student activity sheet (LKM) (Wardani, et al., 2021). The LKM role is to help students understand the material and help lecturers deliver material according to the learning objectives that have been formulated (Indayati, 2020). LKM supports students in carrying out problem-solving activities so that student work on LKM can help students to actively participate in the lecture process. LKM in electronic form the form of E-LKM can be a breakthrough to create a more practical and efficient learning process. Various advantages of E-LKM in digital form such as being practical, easy to access, and not requiring large costs make them a form of innovation for teaching lecturers in facilitating students to be actively involved in the learning process (Aldresti, et al., 2021).

The results of the researcher's interview with the entrepreneurship subject lecturer found that in the learning process, the teaching materials in the form of E-LKM have not been used, which are commonly used are books, YouTube, websites, and PPT. In addition, the teaching materials used have never been related to chemistry, linking teaching materials to chemistry is deemed necessary, especially for chemistry education students studying entrepreneurship courses, so that they can make students interested because it relates to the study program they are taking.

Based on this description, the researcher is interested in developing an E-LKM for entrepreneurship courses related to chemistry, namely E-LKM utilization of used cooking oil. Used cooking oil is cooking oil that has been used for frying several times and then the compound decomposes so that its quality drops sharply. According to Djatmiko & Widjaja in Afrozi, et al. (2017) used cooking oil was damaged during the repeated frying and heating process, which would affect the quality and nutritional value of the fried foodstuffs. If used cooking oil is consumed again, it can cause coronary heart disease. Used cooking oil can also clog household pipelines, causing rancid odors and water pollution. Domestic consumption of cooking oil in Indonesia in 2019 reached 13 million tons or 16.2 million kiloliters, while the amount of used cooking oil that could be collected in Indonesia in 2019 reached 3 million kiloliters with 1.6 million kiloliters coming from urban households big (Setiawan, 2021). Based on the empirical experience of the researchers, it was found that the amount of used cooking oil that could be collected, especially in Riau province, was as much as 40 tons of used cooking oil per month. Processing used cooking oil can provide many benefits in everyday life, as research conducted by Ahmad, et al. (2016) found that used cooking oil can be processed into biodiesel. Based on research conducted by Mardiana, et al. (2020) found that used cooking oil can be processed into soap. Likewise, the research conducted by Aini, et al. (2020) found that used cooking oil can be processed into environmentally friendly candles. Used cooking oil is a household waste that can harm the environment if it is disposed of carelessly. In addition to helping reduce environmental pollution, the use of used cooking oil can be an additional income because products made from used cooking oil can have economic value and generate profits. With ingredients that are quite simple and easy to find, it will make it easier to make this used cooking oil product. Used cooking oil products have several advantages, for example, used cooking oil laundry soap has advantages over ordinary laundry soap. This soap is effective for cleaning greasy dirt, oil, and blood. This soap is also cheaper than laundry soap available in the market.

The research conducted was development research using the Plomp development model. The results of this study contain the validity and response of users to E-LKM. This development research aims to develop E-LKM management of used cooking oil for chemistry education students. The development of the E-LKM is adjusted to the criteria for preparing the E-LKM and the competencies to be achieved in the learning process. The developed E-LKM has an introductory section consisting of the drafting team, preface, table of contents, instructions for using the E-LKM, and learning objectives, the content section consists of 4 learning activities for making products from used cooking oil, while the final part consists of a bibliography. On each page of the E-LKM, there are buttons to go to the previous and next page, buttons to go to the front and back cover, buttons to zoom in and zoom out, full-screen buttons, and buttons to search for specific articles and pages. This E-LKM is also equipped with pictures and videos made by the author himself and some are from various sources such as the results of experiments conducted by students, books, and the internet. E-LKM was created using the 3D Pageflip Professional application.

According to Fitriyani, et al. (2017) 3D Pageflip Professional is application software used to create e-books, digital magazines, e-papers, and others. 3D Pageflip Professional is a kind of professional page flip software to convert PDF files to digital publication flip pages. Each page of the resulting PDF can be flipped like a real book. With 3D Pageflip Professional software, you can add videos, images, audio, hyperlinks, and multimedia objects.

Several studies on the development of E-LKM have been conducted by Siregar, et al. (2021) which shows that the developed E-LKM can improve students' mathematical creative thinking abilities in integral calculus material. Another relevant study was conducted by Aldresti, et al. (2021) in the basics of MIPA education which shows that the developed E-LKM is suitable for use in the learning process. Another relevant research conducted by Murtalib, et al. (2022) shows that the developed E-LKM is valid and practical and can increase the effectiveness of learning outcomes. Other relevant research was conducted by Kamaluddin, et al. (2022) in the nahw course which shows that the E-LKM being developed is valid and practical and can facilitate students' higher-order thinking skills. The same research was conducted by Oktaviana & Susiaty (2022) where the results showed that the developed E-LKM could facilitate the achievement of students' mathematical representation skills in graph theory courses. In addition, several studies show the level of student need for E-LKM, such as research conducted by Budiono, et al. (2022) which shows that it is necessary to develop E-LKM in economic mathematics courses. Likewise, research conducted by Maulana & Sopandi (2022) shows the need for the development of E-LKM that trains 4C skills so they can be used in pandemic situations and trains digital literacy and 21st-century skills.

2. METHODS

This research is development research using the Plomp development model. The Plomp development model consists of 5 main stages. Namely: 1) initial investigation; 2) design; 3) realization or construction; 4) test, evaluation and revision; 5) implementation (Syafri, 2018). However, in this study, the researcher only carried out until the fourth stage, namely the test, evaluation, and revision stages. This research focuses on the development of E-LKM utilization of used cooking oil using the 3D Pageflip Professional application. This research was conducted from January to April 2022. This research was conducted at the Riau University, Sultan Syarif Kasim Riau State Islamic University, Muhammadiyah Riau University, Pasir Pengaraian University, Business and Technology Pelita Indonesia Institute, and Riau Islamic University. The research subjects are 6 validators consisting of 3 material experts and 3 media experts who are Riau University Lecturers, Sultan Syarif Kasim Riau State Islamic University Lecturers, Muhammadiyah Riau University Lecturers, Pasir Pengaraian University Lecturers, and Lecturers of the Business and Technology Pelita Indonesia Institute, as well as users consisting of 3 lecturers of entrepreneurship courses and 30 students of Riau University, Sultan Syarif Kasim Riau State Islamic University, and Riau Islamic University. Meanwhile, the object of this research is the E-LKM utilization of used cooking oil using the 3D Pageflip Professional application. Data collection techniques in this study were interviews, documentation, and questionnaires. The questionnaires used are arranged based on the Likert scale including validity test questionnaires by material experts and media experts, and response questionnaires by lecturers and students. The research questionnaire scale used can be seen in the following table.

Table 1. Research Questionnaire Scale

Score	Description
5	Very good
4	Good
3	Pretty good
2	Less good
1	Not good

(Sugiyono, 2017)

The questionnaire data obtained in this study were processed by descriptive statistical analysis. The level of feasibility or validity and user response to the product is obtained by calculating the percentage using the following formula: (Riduwan, 2014)

$$\text{Percentage} = \frac{\text{Total Score of Assessment Results}}{\text{Highest Score}} \times 100\%$$

The data from the assessment results with known percentages are described and conclusions are drawn about each aspect of the assessment. To make it easier to read the research results, the percentage interval table to assess the level of validity of the developed product can be described as follows which this table has been adapted and modified.

Table 2. Percentage of Product Validity

Percentage	Criteria
81-100%	Very feasible/very valid/no revision needed
61-80%	Feasible/valid/no revision needed
41-60%	Less feasible /less valid/needs revision
21-40%	Not feasible /invalid/needs revision
< 20%	Very not feasible /very invalid/needs revision

(Arikunto, 2013)

The lecturer's response questionnaire is used to determine the lecturer's response to the developed product. The percentage interval table of the assessment results for lecturer responses can be described as follows which this table has been adapted and modified.

Table 3. Percentage of Lecturer Response

Percentage	Criteria
81-100%	Very good
61-80%	Good
41-60%	Pretty good
21-40%	Not good
< 20%	Very not good

(Arikunto, 2013)

Student response questionnaires were used to assess the attractiveness of the developed product. The percentage interval table of the assessment results for student responses can be described as follows which this table has been adapted and modified.

Table 4. Percentage of Student Response

Percentage	Criteria
80-100%	Attractive
60-79%	Quite attractive
50-59%	Less attractive
< 49%	Not attractive

(Akbar, 2013)

3. FINDINGS AND DISCUSSION

3.1 Initial Investigation

At this stage, interviews were conducted with lecturers of entrepreneurship courses at Riau University, Sultan Syarif Kasim Riau State Islamic University, and Riau Islamic University. Based on the results of interviews with lecturers for entrepreneurship courses, data was obtained that in the learning process, teaching materials in the form of E-LKM had not been used, which were commonly used in books, youtube, websites, and PPT. In addition, the teaching materials used have never been associated with chemistry, linking teaching materials with chemistry is considered necessary, especially for chemistry education students studying entrepreneurship courses, so that they can make students interested because it is related to the study program they are taking.

Developing entrepreneurship teaching materials in the form of E-LKM that utilizes the processing of used cooking oil waste is one of the efforts that teach students to overcome the used cooking oil waste. Used cooking oil treatment can provide many benefits in everyday life. In addition to helping reduce environmental pollution, the use of used cooking oil can be an additional source of income because products made from used cooking oil can be economically valuable and generate profits. Research conducted by Yuarini, et al. (2021) found that used cooking oil can be converted into high-value-added products, namely aromatherapy candles, liquid soap, and biodiesel. Based on the analysis of its economic added value, aromatherapy candles are classified as products with low added value, liquid soap is classified as a product with high added value, and biodiesel is classified as a product with moderate added value. Research conducted by Goswami, et al. (2015) found that oil becomes very viscous and becomes a dangerous product for consumption when heated repeatedly, this harmful product (cooking oil) can be minimized by making soap. Research conducted by Sarif, et al. (2019) it was found that learning about recycling used cooking oil makes students able to make solid soap from used cooking oil to overcome the problems caused by used cooking oil, that it is effective in improving students' higher-order thinking skills.

3.2 Design

3.2.1 Determining Learning Objectives

Learning outcomes for entrepreneurship courses related to the KKNI are mastering and being able to decipher the meaning and principles of entrepreneurship as well as implementing them for entrepreneurship and working effectively both individually and as a team in formulating and disseminating entrepreneurial characteristics widely through formal, informal and non-formal education (CP special skills), internalize entrepreneurial values and attitudes, such as independence, creativity, decision-making skills, skills to capture opportunities, etc. (CP attitude), have self-readiness to become an entrepreneur, especially in the field of education and be able to work both individually and in teams (CP general skills).

The expected ability is that students can understand and explain the analysis of profitable business opportunities and take into account Break Event Points. According to Mustakim, et al. (2020) Break Even Point (BEP) is a point that shows the total revenue generated by the company or industry is equal to the total costs incurred so that the company does not make a profit and does not suffer a loss. According to Juriah & Juniawaty (2020), Break-Even Point (BEP) analysis or the break-even point is an analytical technique to study the relationship between total costs, expected profits, and sales volume. In general, this analysis also provides information about the margin of safety which is useful as an indication and an illustration to the management of how much sales decline can be estimated so that the business is carried out does not suffer a loss. Analysis with BEP is used to see whether the management of a company has successfully achieved the sales or service targets that have been set. This is very important because the calculation of this analysis is a benchmark for the company to survive or not. According to Utami & Mubarak (2021) the break-even point condition in a business is known through a method known as Break-Even Point analysis. Break-Even Point Analysis is an

analytical method by studies the relationship between fixed costs, variable costs, profits, and the volume of activity (production/sales).

Based on the initial investigation, learning outcomes, and expected abilities, it can be obtained that the learning objectives in this study are to develop an E-LKM for the use of used cooking oil for chemistry education students in the entrepreneurship course so that students can treat used cooking oil waste and can carry out business analysis of the product which has been made.

3.2.2 Making Research Instruments

At this stage, research instruments are made which become the criteria for evaluating E-LKM utilization of used cooking oil. The instrument used has been modified according to the needs in the E-LKM utilization of used cooking oil assessment. The instruments used are material and media validation questionnaires, lecturer response questionnaires, and student response questionnaires.

3.2.3 Gathering Support Materials

The media is used in the form of media pictures and videos. Pictures and videos are obtained from the results of experiments that have been carried out by students, and there are also pictures and videos from books and the internet. Microsoft Publisher 2010 is used to write text and then turn it into PDF and 3D Pageflip Professional is used to unite all existing media into an E-LKM utilization of used cooking oil.

3.2.4 Doing Material Compilation

The E-LKM utilization of used cooking oil material is organized into 4 activities. The first activity discussed making soap from used cooking oil, the second activity discussed making aromatherapy candles from used cooking oil, the third activity discussed making biodiesel from used cooking oil, and the fourth activity discussed making fertilizer from used cooking oil.

3.2.5 Preparing E-LKM Utilization of Used Cooking Oil

The development of E-LKM utilization of used cooking oil is structured using the following E-LKM framework: 1) The title of the activity, the theme, and the sub-theme contain the topic of the activity according to the learning objectives and the identity of the entrepreneurship course; 2) Objectives, learning objectives following the abilities to be achieved; 3) Tools and materials, if learning activities require tools and materials, then write down the tools and materials needed. This E-LKM is structured to carry out a product manufacturing experiment, therefore tools and materials are needed in this E-LKM; 4) Work procedures, containing work instructions for students that function to facilitate students in carrying out learning activities in the form of experimenting with making products with used cooking oil waste as raw material; 5) Data table, contains a table where students can record the results of observations or measurements. For activities that do not require data, it can be replaced with tables or empty boxes that students can use to write, draw or count. In the E-LKM utilization of used cooking oil, there are tables on business analysis as examples to guide students in conducting business analysis on products that have been made or other business products; 6) Discussion materials, containing questions that guide students to analyze data and conceptualize. The discussion material contained in the E-LKM utilization of used cooking oil is in the form of evaluation questions.

3.3 Realization or Construction

At this stage, a development product is produced based on the design that has been designed. The product is an initial draft of an E-LKM utilization of used cooking oil. The resulting E-LKM consists of a cover containing the title of E-LKM, the name of the course, the name of the author, and the logo of the Riau University. There are also instructions for using E-LKM and learning objectives. The learning activities contain a summary of the material, tools and materials, work procedures, business analysis, and evaluation. At the end, there is a bibliography of the developed E-LKM.

3.4 Test, Evaluation, and Revision

3.4.1 Material and Media Validation

Material and media validation was carried out by 6 validators, of which 2 were experts validators in the field of chemistry, 1 was an expert validator in the field of entrepreneurship and 3 validators were experts in the media field. Material validation aims to see the feasibility of content, presentation feasibility, and language assessment referred to from the components of the assessment of teaching materials according to BSNP (2014). Media validation aims to assess the display design of the E-LKM and the quality of the E-LKM media. The validation of E-LKM by media experts consists of 2 aspects, namely the aspect of the feasibility of graphics and the aspect of the feasibility of programming. The following presents the results of the validation assessment by material experts and media experts as a whole.

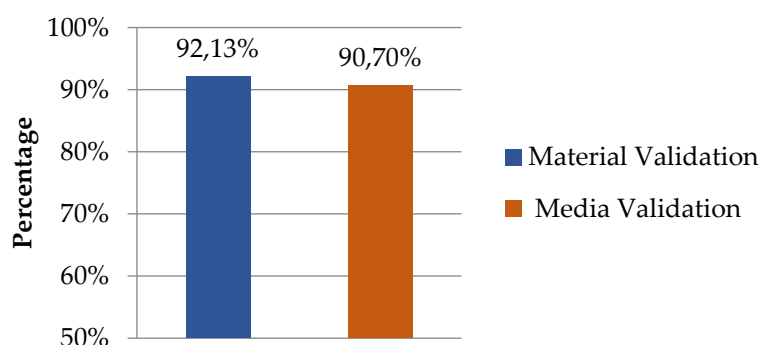


Figure 1. Percentage of E-LKM Validation

Figure 1 is the result of E-LKM utilization of used cooking oil validation by material experts and media experts, where material validation gets a percentage of 92.13% with a very valid category and media validation gets a percentage of 90.70% with a very valid category. This is because the E-LKM utilization of used cooking oil has been revised based on improvements and suggestions from the validator. Improvements and suggestions from the validator can be seen in the following table.

Table 5. Validator Improvements and Suggestions

No.	Material Expert Improvements and Suggestions	No.	Media Expert Improvements and Suggestions
1.	Add narration before images, videos, and tables.	1.	Fix covers.
2.	Adding quantities and units of tools and materials.	2.	Create a drafting team.
3.	Clarify numbering on work procedures.	3.	Create a table of contents.
4.	Provide numbers and descriptions for all tables.	4.	Improved usage instructions.
5.	Clarify temperature and time information on work procedures.	5.	Add video source.
6.	Added entrepreneurial inspirational stories.	6.	Change the font size.
7.	Clarify the concept and definition of costs used.	7.	Combine colors.
8.	Fix the wrong formula in business analysis.	8.	Smooth out the margins in each paragraph.
9.	Clarify the amount of the final product in the business analysis.		
10.	Adjusted writing with PUEBI.		
11.	Make sentences with SPOK patterned work procedures.		

3.4.2 Small-Scale Trial

Limited trials (small scale) were conducted on 3 lecturers of entrepreneurship courses and 30 students of chemistry education at Riau University, Sultan Syarif Kasim Riau State Islamic University, and Riau Islamic University. The limited trial aims to determine the response of lecturers and students to the E-LKM utilization of used cooking oil. The results of the lecturer and student response questionnaire assessment can be seen in the following picture.

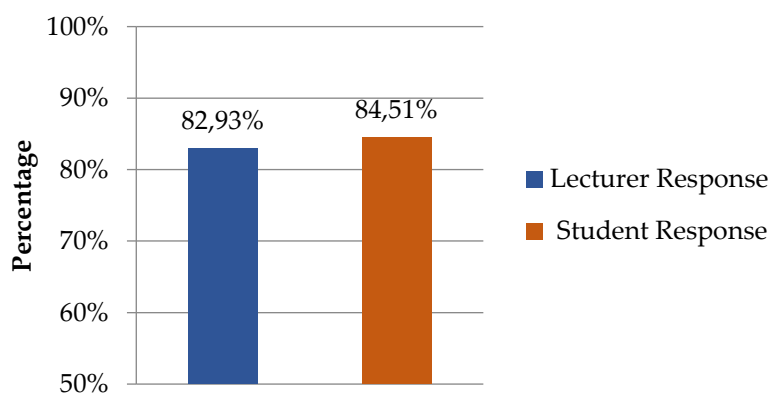


Figure 2. Percentage of User Response to E-LKM

Overall, from the results of the analysis of the questionnaire assessment data lecturers' response for the entrepreneurship course, a percentage value of 82.93% was obtained in the very good category and the results of the data analysis of the questionnaire assessment chemistry education student response got a percentage value of 84.51% with an attractive category, so it can be stated that E-LKM utilization of used cooking oil is good and interesting to use in the learning process.

Based on the results of small-scale trials, on the assessment of the ease of use aspect, it can be concluded that the E-LKM utilization of used cooking oil is easy to use, has clear and easy-to-understand material descriptions and examples of questions, and has instructions for using E-LKM that are easy to understand. In the assessment of the efficiency aspect of learning time, it can be concluded that E-LKM using cooking oil can save time and is efficiently used in learning, can be used anywhere and anytime, can be used for independent study, and can save learning costs because it converts printed documents into digital documents. Meanwhile, in the assessment of the benefits aspect, it can be concluded that E-LKM can add insight to readers, make learning more focused, coherent, and not boring and encourage readers to discuss.

There have been many studies that have examined the development of teaching materials, but each research has its characteristics and is different from this research. Both of the methods used, the subject matter studied and the applications used. Research conducted by Ekayanti, et al. (2021) under the title "Chemoentrepreneurship Based Student Worksheet Development to Improve Enterprise Interest in Chemical Teachers" discusses the development of LKM on chemo entrepreneurship-based biomolecule materials. The study used the Plomp development model and obtained a validation result of 95% with a valid category, one-on-one test results of 84.80% with a very practical category, lecturer responses of 90.40% with a good category for use in the learning process, test results small scale of 85.16% with a very practical category. The difference between this research and this research lies in the material studied, where the material studied in this study is material in the entrepreneurship course, namely the calculation of Break-Even Point (BEP) and relates it to chemistry. The difference is also in the display of the Student Activity Sheet (LKM), in this study the LKM was displayed electronically using the 3D Pageflip Professional application.

Research conducted by Utami & Isnawati (2018) with the title "The Development of Students Worksheet Based on Bioentrepreneurship in the Fungi Material to Teach Life Skills for Tenth Grade of Senior High School" discusses the development of LKPD on mushroom (fungi) based materials. Bio

entrepreneurship. The study used the Four-D (4D) development model and obtained validation results with a very feasible category, and it was found that the LKPD developed was practical. The difference between this research and this research lies in the type of teaching materials developed, in this study developing an E-LKM. Differences are also found in the material studied, in this study studied the calculation of Break-Even Point (BEP) in entrepreneurship courses related to chemistry. Differences are also found in the development model used, in this study using the Plomp development model.

4. CONCLUSION

Based on the data analysis and discussion, it can be concluded that the electronic student activity sheet (E-LKM) utilization of used cooking oil can be developed using the Plomp development model and using the 3D Pageflip Professional application. E-LKM utilization of used cooking oil was declared very valid or very feasible to be used in the learning process based on the assessment of material experts and media experts, where material validation received a very valid assessment (92.13%) and media validation received a very valid assessment (90.70%). E-LKM utilization of used cooking oil received a response from lecturers with a very good rating (82.93%) and from students receiving an interesting rating (84.51%).

Researchers suggest that lecturers of entrepreneurship courses in chemistry education study programs can apply the learning process using E-LKM utilization of used cooking oil to support student competence in the 21st century. It is necessary to develop other teaching materials based Information and Communication Technology (ICT) because using ICT is a must-have skill in the 21st century.

REFERENCES

- Afrozi, A. S., Iswadi D., Nuraeni N., & Pratiwi, G. I. (2017). Pembuatan Sabun dari Limbah Minyak Jelantah Sawit dan Ekstrak Daun Serai dengan Metode Semi Pendidihan. *Jurnal Ilmiah Teknik Kimia Unpam*, 1(1), 1-10.
- Ahmad, H. S., Bialangi, N., & Salimi, Y. K. (2016). Pengolahan Minyak Jelantah Menjadi Biodiesel. *Jurnal Entropi*, 11(2), 204-214.
- Aini, D. N., Arisanti, D. W., Fitri, H. M., & Safitri, L. R. (2020). Pemanfaatan Minyak Jelantah untuk Bahan Baku Produk Lilin Ramah Lingkungan dan Menambah Penghasilan Rumah Tangga di Kota Batu. *Jurnal Warta Pengabdian*, 14(4), 253-262.
- Akbar, S. (2013). *Instrumen Perangkat Pembelajaran*. Bandung: Rosda.
- Aldresti, F., Erviyenni & Haryati, S. (2021). Pengembangan Lembar Kegiatan Mahasiswa Elektronik (E-LKM) Berbasis Collaborative Learning untuk Mata Kuliah Dasar-Dasar Pendidikan MIPA. *PENDIPA Journal of Science Education*, 5(3), 292-299.
- Arikunto, S. (2013). *Prosedur Penelitian Suatu Pendekatan Praktik*. Jakarta: PT. Rineka Cipta.
- Aulia, E. V. (2020). *Pengembangan Lembar Kegiatan Mahasiswa (LKM) Berbasis Inkuiri pada Praktikum Daring Mata Kuliah Larutan*. Surabaya: Kemdikbud.
- BSNP. (2014). *Instrumen Penilaian Bahan Ajar*. Jakarta: BSNP 2014.
- Budiono, D., Ratnawuri, T., & Farida, N. (2022). Analisis Kebutuhan Pengembangan E-LKM Interaktif Berorientasi Profetik pada Mata Kuliah Matematika Ekonomi. *SNPPM-4 (Seminar Nasional Penelitian dan Pengabdian kepada Masyarakat) Tahun 2022*, 52-57.
- Ekayanti, A., Noer, A. M., & Linda, R. (2021). Chemoentrepreneurship Based Student Worksheet Development to Improve Enterprise Interest in Chemical Teachers. *Journal of Educational Sciences*, 5(2), 312-324.
- Fitriyani, M. & Rusdi, M. (2017). Pembelajaran Menggunakan Media 3D Pageflip Professional dan Media Camtasia Studio 8 pada Materi Larutan Elektrolit dan Non Elektrolit di Kelas X SMA Islam Al-Arief Muaro Jambi. *Respiratory University of Jambi*, 2(1), 1-9.
- Goswami, G., Bora, R., & Rathore, M. S. (2015). Oxidation of Cooking Oils Due to Repeated Frying and

- Human Health. *International Journal of Science Technology and Management*, 4(1), 495-501.
- Indayati, T. (2020). Pengembangan Lembar Kerja Mahasiswa (LKM) Berbasis Metode Ilmiah untuk Penguasaan Konsep Lingkungan dan Perubahannya. *AULADUNA: Jurnal Pendidikan Dasar Islam*, 7(1), 46-59.
- Juriah, S., & Juniawaty, R. (2020). Break Even Point Analysis on Sabana Fried Chicken Jatirahayu Outlet Bekasi. *LITERATUS Literature for Social Impact and Cultural Studies*, 2(2), 141-148.
- Kamaluddin, Husna, L. A., Nurlaila, Amelia, Musthafa, I., & Elwarfali, S. H. S. (2022). Development of HOTS Based E-Worksheet for Arabic Grammar Course in Department of Arabic Language Education. *Ta'dib Journal*, 25(2), 177-186.
- Mardiana, S., Mulyasih, R., Tamara, R., & Sururi, A. (2020). Pemanfaatan Limbah Rumah Tangga Minyak Jelantah dengan Ekstrak Jeruk dalam Perspektif Komunikasi Lingkungan di Kelurahan Kaligandu. *Jurnal Solma*, 9(1), 92-101.
- Maulana, Y. & Sopandi, W. (2022). Needs Analysis of Electronic Student Worksheets to Practice 4C Skills. *Jurnal Basicedu*, 6(1), 602-611.
- Murtalib, Gunawan, & Syarifuddin. (2022). Pengembangan Lembar Kerja Mahasiswa Elektronik (E-LKM) Interaktif Berbantuan Live Worksheet pada Perkuliahan Daring. *SUPERMAT: Jurnal Pendidikan Matematika*, 6(2), 130-145.
- Mustakim, Taufik, R., & Trismawati. (2020). The Utilization of Waste Cooking Oil as A Raw Material of Soap. *Journal of Development Research*, 4(2), 86-91.
- Oktaviana, D. & Susiaty U. D. (2022). Pengembangan E-LKM Berbasis Konstruktivisme Berbantuan Quizizz dalam Meningkatkan Kemampuan Representasi Matematis Mahasiswa. *SAP (Susunan Artikel Pendidikan)*, 6(3), 340-349.
- Riduwan. (2014). *Dasar-Dasar Statistika*. Bandung: Alfabeta.
- Sarif, Y., Fadiawati, N., & Syamsuri, M. M. F. (2019). The Effectiveness of Waste Cooking Oil Recycling Project-Based Learning to Improve Students' High Order Thinking Skills. *International Journal of Chemistry Education Research*, 3(1), 29-34.
- Setiawan, V. N. (2021). Lebih Ekonomis Minyak Jelantah Masih Terbatas untuk Bahan Biodiesel. Retrieved December 30, 2021, from <https://katadata.co.id/yuliawati/ekonomi-hijau/5ff6c9d956b66/lebih-ekonomis-minyak-jelantah-masih-terbatas-untuk-bahan-biodiesel>.
- Siregar, H. M., Solfitri, T., & Siregar, S. N. (2021). Development of E-Worksheet of Integration Technique Rational Functions Different Linear Factors to Improve Mathematical Creative Thinking Skills. *Universitas Riau International Conference on Education Technology (URICET-2021)*, 35-40.
- Sugiyono. (2017). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Bandung: PT Alfabeta.
- Syafri, F. S. (2018). *Pengembangan Modul Pembelajaran Aljabar Elementer di Program Studi Tadris Matematika IAIN Bengkulu*. Bengkulu: CV. Zigie Utama.
- Utami, W. & Isnawati. (2018). The Development of Students Worksheet Based on Bioentrepreneurship in the Fungi Material to Teach Life Skill for Tenth Grade of Senior High School. *Jurnal Berkala Ilmiah Pendidikan Biologi*, 7(2), 223-229.
- Utami, Y. & Mubarak, A. (2021). Determining Products or Services Pricing on MSME Using Break Even Point Analysis Method. *International Journal of Economics, Bussiness, and Accounting Research (IJEBAAR)*, 5(2), 7-21.
- Wardani, P. A., Hadel, M., & Sari, D. K. (2021). Pengembangan Lembar Kerja Mahasiswa (LKM) Berbasis Project Based Learning (PjBL) Materi Analisis Kuantitatif Protein pada Mahasiswa Pendidikan Kimia. *Jurnal Penelitian Pendidikan Kimia: Kajian Hasil Penelitian Pendidikan Kimia*, 8(1), 73-84.
- Yuarini, D. A. A., Putra, G. P. G., Wiranatha, A. A. P. A. S., & Wrasati, L. P. (2021). Production and Added Value of Waste Cooking Oil Product Derivatives in the Bali Province. *Advances in Food Science, Sustainable Agriculture and Agroindustrial Engineering 2021*, 4(1), 56-62.